

## Memorandum

To: *Richard Reine*  
*Director, Concord Public Works*

From: *Pamela Lamie, MPH*

Date: *April 24, 2007*

Subject: *Rubber Crumb Health Risk Evaluation*

At your request, I have reviewed the available literature regarding the use of rubber crumb in artificial turf infields – both pro and con – and in my professional opinion the artificial turf field would present no significant risk to human health. I base my conclusion on the known physical/chemical properties of polycyclic aromatic hydrocarbons (PAHs), key scientific exposure assessment studies that have been conducted on the subject and the long term use of the rubber crumb material at elementary school playgrounds in California.

The basis of concern among some groups in the general public is the fact that PAH compounds, some of which are classified as probable human carcinogens, are contained within the rubber crumb material. It should be noted however, that in addition to being found in rubber, PAHs are ubiquitous in the environment. PAHs are the byproducts of incomplete combustion which means that they are released into the environment from sources such as the smoke and ash of fires, diesel exhaust and car exhaust. Once released into the atmosphere they adhere to particulates, gradually fall to the earth, and are deposited in surface soil. One of the key physical properties of PAHs is that they adhere tightly to soil particles – which means once they land in soil they tend to remain in soil rather than leach to groundwater when it rains. Therefore, soil cleanup goals at waste sites are set to background levels for PAHs since it is recognized that they are present in the environment. Background values are available both for natural soils and soils in urban environments.

Available studies that have evaluated the tire crumb have shown that there is a slight amount of leaching of PAHs from the rubber material over time. The common theme in many of these studies is that PAHs are contained within the rubber material, the risk of leaching from the rubber is low, and therefore the risk of exposure is low. If there is little to no exposure then human health risk is low.

For example, in a Canadian public health study, the author's explain that there would be no significant risk to human health from inhalation since any volatile chemicals would be long

gone after the rubber tires undergo the shredding process. There would be no significant risk from oral ingestion in any rubber crumb was swallowed since the gastrointestinal tract would not be able to extract the PAHs or any other chemicals from the rubber material. And there would be no significant risk from dermal exposure as water or sweat alone would not be enough to extract the PAHs from the rubber and transport them through the skin.

Another key public health study was an actual field study conducted in the Netherlands where the urine of professional soccer players was tested both before and after playing on artificial turf fields over a period of days to determine if there was any risk from dermal contact. No PAH metabolites were detected in the player's urine and it was concluded that playing on the fields presents no significant health risk. This study was used as the basis for Dutch government to lift its ban on the installation of artificial turf fields.

While there are no long term epidemiological studies either available or conducted to date regarding the use of artificial turf fields, there are no reported adverse health affects reported for those locations with long term use of the tire crumb. For example, in 1997, 10,000 pounds of tire crumb was placed on the playgrounds of several elementary schools in the City of Torrance California. Ten years later, not only have there been no reported cases of adverse health effects associated with the material, but Torrance is considered a success story for the beneficial reuse of the recycled tire materials.

In conclusion, it is my opinion that the tire crumb material in artificial turf fields would pose no significant health risk for their intended use. My opinion is based on the known low leaching property of PAHs which would preclude exposure, the results of the two unbiased scientific public health studies, and the long term use of the tire crumb material in California.